REMARKS

Applicants submit this Amendment in response to the non-final Office Action

mailed August 4, 2006, the period for response to which has been extended through

February 4, 2007, by a petition for a three-month extension of time and associated fee

filed herewith. Applicants respectfully traverse all pending objections and rejections and

request reconsideration of the application, as amended.

Claims 22-44 are pending in this application, of which claims 22 and 35 are

independent. In this response, Applicants have amended claims 22, 24, and 35 for

purposes of clarity. The Examiner rejected claims 22, 24, and 36 under 35 U.S.C. §

112 as being indefinite and failing to provide enablement for making the invention.[1] The

Examiner also rejected claims 22-27 and 29-30 under 35 U.S.C. § 102(b) as being

anticipated by U.S. Patent No. 6,400,508 to Liu ("Liu") and rejected claims 35-36 under

35 U.S.C. § 103(a) as being obvious over Liu in view of U.S. Patent Application

Publication 2002/0027472 to Lee et al. ("Lee"). The Examiner identified allowable

subject matter in claims 28, 31-34, and 37-44 and suggested that these claims would be

allowable if they were rewritten in independent form so as to overcome the pending 35

U.S.C. § 112 rejections.

Rejections Under 35 U.S.C. § 112

The Examiner has rejected claims 22, 23, and 36 under 35 U.S.C. § 112, ¶¶ 1, 2

because the phrase "being adapted for obtaining a transition between the half-wave

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[1] Although claim 36 has been rejected under 35 U.S.C. § 112, the claim recitation at
issue is recited in independent claim 35, and not claim 36. For this reason, Applicants
believe that the Examiner made a typographical error and intended to reject claim 35
rather than claim 36 under 35 U.S.C. § 112.

retarder behavior and the full-wave retarder behavior in a frequency range lower than or equal to 40% of the period of said transfer function" is allegedly improper since the Examiner reasons that frequency and period have reciprocal units. While the Examiner's concern may be well founded in other contexts, Applicants respectfully disagree that these terms have reciprocal units as recited in claims 22, 23, and 35.

First, Applicants note that a function is "periodic" when it repeats after a fixed interval (period) of its independent variable.[2] Thus, by definition, if a function is periodic in frequency (or "frequency periodic"), then the function will repeat after a fixed frequency interval. For example, FIG. 33a in the Applicants' specification shows a graph of an exemplary "frequency periodic" transfer function in which the value of the function repeats after a fixed interval of normalized frequency ("v/A"). *See* specification, p. 52, ll. 2-3 ("Figure 33a shows a periodic transfer function versus frequency v normalized on the frequency period A of a stack of birefringent waveplates.")

Independent claims 22 and 35 each recites, among other things, "at least a first wavelength selective reciprocal polarization rotator having a half-wave retarder behavior for a first group of optical frequencies and a full-wave retarder behavior for a second group of optical frequencies, according to a substantially frequency periodic transfer function" (emphasis added). Accordingly, the claimed "frequency periodic transfer function" is periodic in frequency, and thus repeats itself over a fixed frequency interval, or "period."

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[2] The word "periodic" is defined as "(of a function) having a graph that repeats after a fixed interval (period) of the independent variable." Random House Webster's Unabridged Dictionary (2nd Ed. 1998), p.1440.

In view of the foregoing, Applicants submit that the "period" of the claimed "frequency periodic transfer function" is measured in terms of frequency and, thus, may be compared with any frequency range. For at least this reason, Applicants submit that "to obtain a transition between the half-wave retarder behavior and the full-wave retarder behavior in a frequency range lower than or equal to 40% of the period of said transfer function," as recited in amended claims 22, 24, and 35, does not require inconsistent units of period and frequency as suggested by the Examiner. *See* Office Action, ¶¶ 3-4. Consequently, Applicants submit that the pending 35 U.S.C. § 112 rejections rely on an improper basis and should be removed.

Rejections Under 35 U.S.C. § 102(b)

Applicants respectfully traverse the rejections of claims 22-27 and 29-30 under 35 U.S.C. § 102(b) as being anticipated by Liu. In order to properly establish an anticipation rejection under 35 U.S.C. § 102(b), each and every element of the claims at issue must be found in the applied prior-art reference, either expressly or under principles of inherency. Furthermore, "[t]he identical invention must be shown in as complete detail as is contained in the ... claim." *See* M.P.E.P. § 2131, quoting *Richardson v. Suzuki Motor Co.*, 868 F.2d 1126, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989).

Consider independent claim 22, as amended, which calls for a combination including, for example, a "bidirectional isolating device comprising... at least a first non-reciprocal polarization rotator arranged for rotating a polarization of a signal of substantially 45°± k·90°, wherein k is a non-negative integer" and "[a] first wavelength selective reciprocal polarization rotator comprising a predetermined number of at least

five birefringent elements having a predetermined thickness and orientation, so as to

obtain a transition between the half-wave retarder behavior and the full-wave retarder

behavior in a frequency range lower than or equal to 40% of the period of said transfer

function." Applicants respectfully submit that Liu cannot anticipate Applicants'

independent claim 22, as presently amended, because Liu fails to teach or suggest at

least (a) "a first non-reciprocal polarization rotator," (b) "first wavelength selective

reciprocal polarization rotator," or (c) "transition between the half-wave retarder behavior

and the full-wave retarder behavior...," as recited in Applicants' amended claim 22.

A. Liu fails to teach or suggest at least a "bidirectional isolating device comprising... a first non-reciprocal polarization rotator," as claimed.

Liu teaches an optical interleaver including "a group of optical elements for

decomposing the input light beam into a first light beam including a first set of

wavelengths represented by $\lambda 1$, $\lambda 3$, $\lambda 5$, . . . , λn and a second light beam including of a

second set of wavelengths represented by $\lambda 2$, $\lambda 4$, $\lambda 6$, . . . , $\lambda n-1$." Liu, Abstract. Liu

discloses only a unidirectional optical path, i.e., from an input port 11 to the output ports

13 and 14, for decomposing the input light beam into the first and second output beams.

See Liu, FIGS. 1 and 2A (showing a unidirectional path through the disclosed optical

elements). Liu does not appear to contemplate bidirectional devices.

Because Liu teaches only a unidirectional optical path (FIGS. 1 and 2A), Liu does

not contemplate whether its disclosed optical elements exhibit reciprocal or

non-reciprocal optical properties. That is, the unidirectional path in Liu is not affected by

whether an optical element rotates polarizations of an opposing light beam in the same

direction (non-reciprocal rotation) or opposite direction (reciprocal rotation) as light

propagating along the unidirectional path. For this reason, Liu appears to be completely

silent regarding the use of reciprocal and non-reciprocal polarization rotators. In fact, neither the word "reciprocal" nor "non-reciprocal" (or variants thereof) appears to be present in the Liu disclosure.

In contrast, Applicants' amended independent claim 22 specifically recites a "bidirectional isolating device comprising... a first non-reciprocal polarization rotator." The non-reciprocity of the first polarization rotator (also called a Faraday rotator in the specification) is briefly described, for example, at page 14, lines 17-19 of the specification, and corresponds to the fact that the polarization rotation direction does not depend on the direction of an incoming signal. Thus, if a ray of light is passed through the claimed "non-reciprocal polarization rotator" and reflected back through it, the rotation would double. On the contrary, if a ray of light is passed through a reciprocal polarization rotating material and reflected back through it, the polarization rotation would be nullified.

In summary, Liu cannot anticipate or render obvious Applicants' independent claim 22, as presently amended, because Liu fails to teach or suggest at least a "bidirectional isolating device comprising... a first non-reciprocal polarization rotator," as claimed.

B. Liu fails to teach or suggest at least "[a] first wavelength selective reciprocal polarization rotator comprising a predetermined number of at least five birefringent elements," as claimed.

Liu also fails to teach or suggest at least a "first wavelength selective reciprocal polarization rotator comprising a predetermined number of at least five birefringent elements having a predetermined thickness and orientation" as recited in Applicants' amended independent claim 22.

At paragraph 6 in the Office Action, the Examiner asserts that Liu discloses a wavelength selective reciprocal polarization rotator (WSWP 3), and that "the WSWP comprises a predetermined number of at least five birefringent elements with predetermined thickness and orientation."[3] The Examiner did not specify what part of the Liu specification discloses that the WSWP 3 has at least five birefringent elements. Applicants have carefully analyzed the Liu disclosure and respectfully submit that Liu does not appear to teach or suggest "at least five birefringent elements," as the Examiner suggests.

Instead, Liu appears to disclose that the WSWP 3 consists of two optical elements, and not "at least five birefringent elements" as claimed. Specifically, the WSWP 3 (Wavelength Selection Wave Plate) is described in Liu as being "a type of a Lyot filter" which is "designed as a half wave plate for certain wavelength λ1 and a full wave plate for a desired adjacent wavelength λ2." Liu, col. 5, ll. 4-7. Liu specifies that "the [WSWP 3] wave plate consists of two types of crystals with different optical properties versus thermal effects." Liu, col. 5, ll. 18-20. FIG. 2A in Liu expressly shows these two elements within the WSWP 3— a thin element on the side of glass plate 2 and a thicker element on the side of birefringent crystal 4. Liu further discloses another WSWP 5, which is described to be "identical to wave plate 3." Liu, col. 5, line 22. Like the WSWP 3, the WSWP 5 also consists of two optical elements (as shown in FIG. 2A).

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[3] The Office Action contains a number of statements reflecting characterizations of the related art and the claims. Regardless of whether any such statement is identified herein, Applicants decline to automatically subscribe to any statement or characterization in the Office Action.

In addition, the embodiment shown in FIG. 1 of Liu teaches wavelength filters 61 and 62, each having four waveplates. Again, this disclosed embodiment likewise fails to teach or suggest Applicants' claimed "at least five birefringent elements." Applicants have also considered U.S. Patent No. 5,694,233 to Wu et al. ("Wu"), which Liu incorporates by reference at col. 1, ll. 62-67. FIGS. 2A-B and 3A-B in Wu appear to disclose filters 61 and 62 having three waveplates (see also Example 1 described in Wu, which specifically teaches "three lithium niobate waveplates.")

In short, Applicants submit that claim 22, as amended, is neither anticipated nor rendered obvious in light of the teachings in Liu because Liu fails to teach or suggest at least a "first wavelength selective reciprocal polarization rotator comprising a predetermined number of at least five birefringent elements having a predetermined thickness and orientation" as claimed.

C. Liu fails to teach or suggest at least "a transition between the half-wave retarder behavior and the full-wave retarder behavior in a frequency range lower than or equal to 40% of the period of said transfer function," as claimed.

Liu fails to teach or suggest a "frequency periodic transfer function," and therefore cannot anticipate or render obvious at least "a transition between the half-wave retarder behavior and the full-wave retarder behavior in a frequency range lower than or equal to 40% of the period of said transfer function," as recited in Applicants' amended claim 22. Indeed, the Examiner does not cite to any portion of Liu as teaching or suggesting the Applicants' claimed "a transition between the half-wave retarder behavior and the full-wave retarder behavior..."

Instead, the Examiner argues that "the clause 'adapted for obtaining a transition between the half-wave retarder behavior and the full-wave retarder behavior in a

frequency range lower than or equal to 40% of the period of said transfer function' is essentially a statement of intended or desired use. Thus, these claims as well as other statements of intended use do not serve to patentably distinguish the claimed structure over that of the reference." Office Action, ¶ 6.

In this response, Applicants have amended claims 22, 23, and 35 to remove the "adapted for" language that apparently formed the basis for the Examiner's intended use argument. For example, amended independent claim 22 currently recites, among other things, "said first wavelength selective reciprocal polarization rotator comprising a predetermined number of at least five birefringent elements having a predetermined thickness and orientation, so as to obtain a transition between the half-wave retarder behavior and the full-wave retarder behavior in a frequency range lower than or equal to 40% of the period of said transfer function." Applicants respectfully submit that this amended claim recitation positively recites structural limitations of the claimed invention and, therefore, does not constitute an "intended or desired use," as alleged in the Office Action. Accordingly, Applicants submit that the Examiner's intended-use argument is now moot and should be withdrawn.

Rejections Under 35 U.S.C. § 103(a)

Independent claim 35, as presently amended, although different in scope from Applicants' amended independent claim 22, recites similar claim language and is thus allowable for at least the same reasons. In the Office Action, the Examiner rejected independent claim 35 as being obvious over Liu in view of Lee. *See* Office Action, ¶¶ 7-8. However, Applicants respectfully submit that Lee fails to remedy the above-noted deficiencies in Liu.

Lee teaches "a multi-stage bidirectional optical amplifier that amplifies counter-propagating signals at the same time." Lee, Abstract. The optical amplifier in Lee does not appear to include any polarization rotator elements, let alone any reciprocal or non-reciprocal polarization rotators as recited in Applicants' independent claim 35. In fact, it appears that the words "rotate," "rotator," "rotating," etc. (or their variants) are entirely absent from the Lee disclosure. Apparently aware of these shortcomings in Lee, the Examiner relied on Lee solely for its alleged disclosure of "an optical amplifier, including a pumping system providing pump power to an amplifying optical medium." Office Action, ¶ 8. Thus, the Examiner apparently acknowledged that Lee fails to teach or suggest claim recitations missing from Liu, such as, for example, Applicants' claimed "first non-reciprocal polarization rotator arranged for rotating a polarization of a signal of substantially 45°± k·90°, wherein k is a non-negative integer" and "first wavelength selective reciprocal polarization rotator comprising a predetermined number of at least five birefringent elements having a predetermined thickness and orientation, so as to obtain a transition between the half-wave retarder behavior and the full-wave retarder behavior in a frequency range lower than or equal to 40% of the period of said transfer function," as recited in amended claim 35.

Dependent Claims 23-34 and 36-44

Claims 23-34 and 36-44 depend on independent claims 22 or 35 and are therefore allowable for at least the same reasons.

Conclusion

The preceding remarks are based only on the arguments in the Office Action, and therefore do not address patentable aspects of the invention that were not

addressed by the Examiner in the Office Action. The claims may include other elements that are not shown, taught, or suggested by the cited art. Accordingly, the preceding remarks in favor of patentability are advanced without prejudice to other bases of patentability.
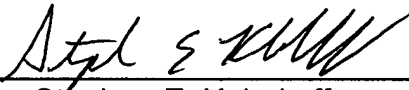
In view of the foregoing amendments and remarks, Applicant respectfully requests reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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1440

igneous rock composed chiefly of olivine with xture of various other minerals. [1895-1900; < gairon, -ite¹] —per·i·do·tit·ic (per'i dō tit'ik, .), adj.

t of Ceylon′, Jewelry. a honey-colored tourused as a gem: not a true peridot.

yan tide′, an ocean tide that occurs in the when the moon is at its perigee.

ee (per'i jē′), n. Astron. the point in the orbit ıvonly body, esp. the moon, or of an artificial satwhich it is nearest to the earth. See diag. under [1685-95; < F perigée < NL perigéum, i. < Gk perigeion (sēmeion limit), neut of um < of the earth, equiv. to peri- peri + near, of the earth, equiv. to perigeon] —per'i·ge'al, ·e'an, adj.

·la·cial (per'i gla'shəl), adj. Geol. occurring or ing adjacent to the margin of a glacier [1925-30; + GLACIAL]

gon (per'i gon′), n. an angle of 860°. Also called angle. [1865-70; PERI- + GON]

zp·ni·um (per'i gō'nē əm), n. pl. -ni·a (-nē ə) the envelope of modified leaves surrounding the ridin in mosses Alsa, per·i·gone (per'i gōn′) .20; < NL, see PERI-, -OONIUM] —per'i·go'ni·al, go'nal, adj.

gord (pā əl gōr′), n. a division of the former ace of Guenne, in SW France

·gor·di·an (per'i gōr'dē ən), adj. of, pertaining r characteristic of an Upper Paleolithic cultural in southern France, esp of the Périgord region -40; Périgord + -IAN]

g·y·nous (pə rij'ə nəs), adj. Bot. 1. situated ad the pistil on the edge of a cuplike receptacle, as ens of petals. 2. having stamens, petals, etc., so arad. [1800-10; < NL perigynus See PERI-, -GYNOUS]

perigynous flower (section)

rig·y·ny (pə rij'ə nē), n. Bot. a perigynous condi-1. [1875-80; PERIGYN(OUS) + -Y¹]

·i·he·li·on (per'ə hē'lē ən, -hēl'yən), n., pl. -he·li·a (-lē ə, -hēl'yə) Astron. the point in the orbit of a net or comet at which it is nearest to the sun. Cf. helion. See diag. under aphelion. [1680-70; < Gk '·- PERI- + hēli(os) sun + -on noun. n. suffix, on the idol of PERICEE earlier in the NL form perihelium] per'i·he'li·al, per'i·he'li·an, adj.

r·i·kar·y·on (per'i kar'ē on′, -ən), n., pl. -kar·y·a car'ē ə). Biol. See cell body. [1895-1900; PERI- + Gk 'ryon nut, kernel]

r·il (per'əl), n. a, -iled, -il·ing or (esp. Brit.) -illed, -ling —n. 1. exposure to injury, loss, or destruction; uva risk: jeopardy, danger: They faced the peril of falu rocks. 2. something that causes or may cause injury, 6s, or destruction —v.t. 3. to expose to danger; imperil, risk. [1175-1225; ME < OF < L periculum trial, st, danger, equiv. to peri-, verb base meaning "try" bund in the compound experir: see EXPERIENCE] 'ulum -CLE²] —per'il·less, adj. —Syn. 1. See danger.

·ril·la (pə ril'ə), n. any of several aromatic Asian lants belonging to the genus Perilla, of the mint family, sp. P. frutescens, which has become naturalized in the aatern U.S. and from which perilla oil is obtained. [< NL (Linnaeus), of uncert orig]

eril'la oil′, a light yellow oil, obtained from the seeds of mints of the genus Perilla, used in the Orient as a ooking oil and elsewhere in the manufacture of varnish, printing ink, and artificial leather. [1915-20]

er·il·ous (per'ə ləs), adj. involving or full of grave risk or peril: hazardous: dangerous: a perilous voyage across the Atlantic in a small boat. [1250-1300; ME < AF perillous < L periculôsus See PERIL. -OUS] —per'il·ous·ly, adv. —per'il·ous·ness, n —Syn. risky. —Ant. safe

per'il point′, the lower limit of a tariff on a commodity at which import of that commodity would have a eriously adverse effect on the local producers. [1945-50]

per·i·lune (per'i lōōn′), n. the point in a lunar orbit that is nearest to the moon Cf. apolune. [1955-60; PERI- -lune < L luna moon, on the model of PERIGEE]

per·i·lymph (per'i limf′), n. Anat. the fluid between the bony and membranous labyrinths of the ear. [1830-40; PERI- + LYMPH] —per'lym·phat'ic, adj

pe·rim·e·ter (pə rim'i tər), n. 1. the border or outer boundary of a two-dimensional figure. 2. the length or boundary of a two-dimensional figure. 3. a line bounding or marking off an such a boundary. 4. the outermost limits 5. Mil. a fortified boundary area. ary that protects a troop position. 6. Ophthalm. an instrument for determining the peripheral field of vision. [1685-95; < F périmètre < L perimetros (fem) < Gk perimetron (neut). See PERI-. METER] —pe·rim'e·ter·less, adj. —pe·rim'e·tral, per·i·met·ric (per'ə me'trik), per'i·met'ri·cal, adj —per'i·met'ri·cal·ly, adv —pe·rim'e·try, n

per·i·morph (per'ə môrf′), n. a crystal of one mineral enclosing that of another mineral. Cf endomorph [def 1). [1880-85; PERI- + -MORPH] —per'i·mor'phic, per'i·mor'phous, adj. —per'i·mor'phism, n.

per·i·my·si·um (per'ə mis'ē əm, -mizh'-), n., pl. -si·a (-mis'ē ə, -mizh'-). Anat. the connective tissue surrounding bundles of skeletal muscle fibers. [1835-45; irreg. from PERI- + Gk mys mouse, muscle (cf. MYO-) -ıUM] —per'i·my'si·al, adj.

par·i·na·tal (per'ə nāt'l), adj. occurring during or pertaining to the phase surrounding the time of birth, from the twentieth week of gestation to the twentyeighth day of newborn life. [1950-55; PERI- + NATAL] —per'i·na'tal·ly, adv.

per·i·na·tol·o·gy (per'ə nə tol'ə jē), n. a field of medicine focusing on problems emerging during the perinatal period [1975-80; PERI- + NATAL) + -o- + .LOGY] · per'i·na·tol'o·gist, n.

per·in·de (par ın'də), adv. (in prescriptions) in the same manner as before. [< L]

per·i·neph·ri·um (per'ə nef'rē əm), n., pl. -neph·ri·a (-nef're ə). Anat. the capsule of connective tissue that envelops the kidney [< NL; see PERI-, NEPHR-, -ıUM] —per'i·neph'ral, per'i·neph'ri·al, adj.

per·i·ne·um (per'ə nē'əm), n., pl. -ne·a (-nē'ə). Anat. 1. the area in front of the anus extending to the chottle of the vulva in the female and to the scrotum in the male. 2. the diamond-shaped area corresponding to the outlet of the pelvis. containing the anus and vulva or the mons of the penis [1625-45; < NL < Gk perineon, perineos, perinoios. appar. equiv to peri(-)- PERI- + ine-, ina-, alema of inein. inān to evacuate, empty + -(i)on n. suffix] —per'i·ne'al, adj.

per·i·neu·ri·um (per'ə nŏŏr'ē əm, -nyŏŏr'-), n., pl. -neu·ri·a (-nŏŏr'ē ə, -nyŏŏr'-), Anat. the sheath of connective tissue that encloses a bundle of nerve fibers [1835-45; < NL, see PERI-. NEUR-. -ıUM] —per'i·neu'ri·al, adj

per·i·nu·cle·ar (per'ə nŏŏ'klē ər, -nyŏŏ'- or, by metathesis, -kyə lər), adj Cell Biol. 1. situated near or occurring around the nucleus. 2. pertaining to the narrow space between the inner and outer layers of the nuclear membrane [1895-1900; PERI- + NUCLEAR] —Pronunciation. See nuclear.

pe·ri·od (pēr'ē əd), n. 1. a rather large interval of time that is meaningful in the life of a person, in history, etc., because of its particular characteristics: a period of illness; a period of great profitability for a company; a period of social unrest in Germany. 2. any specified division or portion of time: poetry of the period from 1603 to 1660. 3. a round of time or series of years by which time is measured. 4. a round of time marked by the recurrence of some phenomenon or occupied by some recurring process or action 5. the point of completion of a round of time or of the time during which something lasts or happens. 6. Educ. a specific length of time during ing school hours that a student spends in a classroom, laboratory, etc., or has free. 7. any of the parts of equal length into which a game is divided. 8. the time during which something runs its course. 9. the present time 10. the point or character ( ) used to mark the end of a declarative sentence, indicate an abbreviation, etc.; full stop 11. a full pause, as is made at the end of a complete sentence. full stop. 12. a sentence, esp. a wellbalanced, impressive sentence: the stately periods of Churchill. 13. a periodic sentence. 14. an occurrence of menstruation. 15. a time of the month during which menstruation occurs 16. Geol. the basic unit of geologic time. during which a standard rock system is formed comprising two or more epochs and included with other periods in an era. See table under geologic time. 17. Physics. the duration of any complete cycle of a wave or oscillation, the reciprocal of the frequency. 18. Music a division of a composition, usually a passage of eight or sixteen measures, complete or satisfactory in itself, commonly consisting of two or more concatenated or complementary phrases ending with a conclusive cadence. 19. Astron. a. the time called period of rotation. the time in which a body rotates once on its axis. b. Also called period of revolution. the time in which a planet or satellite revolves once about its primary. 20. Math. the repetend. 21. Class. Pros a group of two or more cola. —adj. 22. noting. pertaining to. evocative of, imitating, or representing a historical period or the styles current during a specific period of history: period costumes. a period play —intrj. 23. (used by a speaker or writer to indicate that a decision is irrevocable or that a point is no longer discussable): I forbid you to go, period. [1375-1425; late ME periode (< MF) < ML periodus, L < Gk periodos circuit. period of time. period in rhetoric, lit. way around. See PERI-, -ODE²] —Syn. 1. See age. 2. term

per·i·o·date (pə rī'ə dāt′), n. Chem. a salt of a periodic acid, as sodium periodate, NaH₅IO₇. [1835-45 PERIOD(IC ACID) + -ATE²]

pe·ri·od·ic (pēr'ē od'ik), adj. 1. recurring at intervals of time: periodic revivals of an interest in handicrafts. 2. occurring or appearing at regular intervals. 3. periodic visits of a mail steamer to an island repeated at irregular intervals; intermittent: periodic pains. 4. Physics. recurring at equal intervals of time. 5. Math. (of a function) having a graph that repeats after a fixed interval (period) of the independent variable. 6. Astron. characterized by the revolution of a heavenly body, or periodic: the revolution of a heavenly body. 7. pertaining to or characterized by rhetorical periods, or periodic sentences. [1625-45; < L periodicus < Gk periodikós] —pe'ri·od'i·cal·ly, adv.

per·i·od·ic² (pûr'ī od'ik), adj Chem. of or derived from a periodic acid [1830-40; PER- + IODIC]

per·i·od·ic ac'id (pûr'ī od'ik, per'-), Chem. a series of acids derived from I₂O₇ by the addition of water molecules, as HIO₄ or H₅IO₆ [1830-40]

pe·ri·od·i·cal (pēr'ē od'i kəl), n. 1. a magazine or other journal that is issued at regularly recurring intervals. —adj. 2. published at regularly recurring intervals. 3. of or pertaining to such publications. —adj PERIOD, -ıc] —pe'ri·od'i·cal·ly, adv.

i·cal·ism, n. pe·ri·od'i·cal·ist, n —pe·ri·od'i·cal·ness, n

pe·ri·od'i·cal cica'da. See seventeen-year locust. [1835-90]

pe·ri·od'ic dec'imal (per'e od'ik, per'-), Math. See repeating decimal.

per·i·od'ic func'tion (per'ə od'ik, per'-). Math. a function of a real or complex variable that is periodic. Cf. periodic. (def 5).

pe·ri·o·dic·i·ty (pēr'ē ə dis'i tē), n. the character of being periodic, the tendency to recur at regular intervals. [1835-35; < F périodicité See PERIODIC², -ITY]

pe·ri·od'ic law′ (per'ə od'ik, per'-). Chem. 1. the law that the properties of the elements are periodic functions of their atomic numbers 2. Also called Mendeleev's law, (originally) the statement that the chemical and physical properties of the elements recur periodically when the elements are arranged in the order of their atomic weights [1870-75]

pe·ri·od'ic mo'tion (per'ə od'ik, per'-). Physics. any motion that recurs in identical forms at equal intervals of time

pe·ri·od'ic sen'tence (pûr'e od'ik, per'-), a sentence that, by leaving the completion of its main clause to the end, produces an effect of suspense, as in Unable to join the others of the dance because of my sprained ankle, I went to a movie Cf. loose sentence. [1895-1900]

pe·ri·od'ic sys'tem (per'e od'ik, per'-), Chem. a system of classification of the elements based on the periodic law. [1870-75]

pe·ri·od'ic ta'ble (pûr'e od'ik, per'-), Chem. a table illustrating the periodic system, in which the chemical elements, formerly arranged in the order of their atomic weights and now according to their atomic numbers, are shown in related groups. See table below. [1890-95]

per·i·o·dide (pə rī'ə dīd′, -did), n. Chem. an iodide with the maximum proportion of iodine. [1810-20; PERIod(IC ACID) + -IDE]

per·i·od·i·za·tion (pēr'ə ə də zā'shən), n. an act or instance of dividing a subject into historical eras for purposes of analysis and study. [1935-40; PERIOD + -IZAtion]

pe·ri·od·lu·mi·nos'i·ty rela'tion (per'e əd lōō'mə·nos'i tē), Astron. the relationship between the period of light variation and of the absolute magnitude of Cepheid variable stars. [1945-50]

pe'riod of revolu'tion. Astron. period (def 19b)

pe'riod of rota'tion, Astron. period (def 19a).

per·i·o·don·tal (per'e ə don'tl), adj. Dentistry. 1. of or pertaining to the periodontium. 2. of or pertaining to periodontics 3. of or pertaining to the periodontal membrane Also, peridental. [1850-55. PERI- + ODONT + -AL²]

periodon'tal disease′, any of various mixed bacterial infections that affect the soft tissues and bones supporting the teeth Cf. pyorrhea.

per'iodon'tal mem'brane, Dentistry. the collagenous fibrous connective tissue between the cementum of the tooth and the alveolus Also, pericementum. [1895-1900]

per·i·o·don·tics (per'e ə don'tiks), n. (used with a singular v) the branch of dentistry dealing with the study and treatment of diseases of the periodontium.

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per·i·o·date (pə rī'ə dāt'), *n. Chem.* a salt of periodic acid, as sodium periodate, Na₂H₃IO₆. [1830–40; PERIOD(IC ACID) + -ATE²]

pe·ri·od·ic¹ (pēr'ē od'ik), *adj.* **1.** recurring at intervals of time: *periodic revivals of an interest in handicrafts.* **2.** occurring or appearing at regular intervals: *periodic visits of a mail steamer to an island.* **3.** repeated at irregular intervals; intermittent: *periodic outbreaks of the disease.* **4.** *Physics.* recurring at equal intervals of time. **5.** *Math.* (of a function) having a graph that repeats after a fixed interval **(period)** of the independent variable. **6.** *Astron.* **a.** characterized by a series of successive circuits or revolutions, as the motion of a planet or satellite. **b.** of or pertaining to a period, as of the revolution of a heavenly body. **7.** pertaining to or characterized by rhetorical periods, or periodic sentences. [1635–45; < L *periodicus* < Gk *periodikós*. See PERIOD, -IC] —**pe'ri·od'i·cal·ly,** *adv.*

per·i·od·ic² (pûr'i od'ik), *adj. Chem.* of or derived from a periodic acid. [1830–40; PER- + IODIC]

per'i·od'ic ac'id (pûr'i od'ik, pûr'-), *Chem.* any of a series of acids derived from I₂O₇ by the addition of water molecules, as HIO₄ or H₅IO₆. [1830–40]

pe·ri·od·i·cal (pēr'ē od'i kəl), *n.* **1.** a magazine or other journal that is issued at regularly recurring intervals. —*adj.* **2.** published at regularly recurring intervals. **3.** of or pertaining to such publications. *periodic¹.* [1595–1605; PERIODIC¹ + -AL¹] —**per·i·**

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